

**Notice of Allowability**

Application No.

10/616,298

Examiner

Jeffrey L. Gellner

Applicant(s)

BRAULT ET AL.

Art Unit

3643

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--**

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to the after-final amendment received 19 March 2007.
2. ☒ The allowed claim(s) is/are 1,4-17,20-25,28,30,31,33-37 and 39-46.
3. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some\* c) ☐ None of the:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).
- \* Certified copies not received: \_\_\_\_\_.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.  
**THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.**

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
- (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
- 1) ☐ hereto or 2) ☐ to Paper No./Mail Date \_\_\_\_\_.
- (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date \_\_\_\_\_.
- Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

**Attachment(s)**

- |  |   |
|--|---|
| 1. <input type="checkbox"/> Notice of References Cited (PTO-892)   | 5. <input type="checkbox"/> Notice of Informal Patent Application                     |
| 2. <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                       | 6. <input type="checkbox"/> Interview Summary (PTO-413),<br>Paper No./Mail Date _____ |
| 3. <input type="checkbox"/> Information Disclosure Statements (PTO/SB/08),<br>Paper No./Mail Date _____    | 7. <input type="checkbox"/> Examiner's Amendment/Comment                              |
| 4. <input type="checkbox"/> Examiner's Comment Regarding Requirement for Deposit<br>of Biological Material | 8. <input checked="" type="checkbox"/> Examiner's Statement of Reasons for Allowance  |
|  | 9. <input checked="" type="checkbox"/> Other <u>translation of JP2000-69858</u> .     |

### **REASONS FOR ALLOWANCE**

The following is an examiner's statement of reasons for allowance:

The prior art did not disclose or suggest a climate control system for use in a greenhouse having an exterior wall structure which includes primarily transparent panels allowing entry to an interior of natural light, the system being arranged for conditioning the air within the interior and comprising: a plurality of benches arranged to be located within the interior and provide support surfaces for supporting crop materials thereon for receiving the natural light and growing within the interior; in combination with a plurality of air handling systems each associated with a respective one of the plurality of benches and each comprising: an air intake plenum having at least one air intake, a fan connected to the air intake plenum, an outlet duct connected to the fan having an air outlet for expelling air from the outlet duct into the interior of the greenhouse, and at least one air conditioning component for conditioning the air transported from the air intake plenum to the outlet duct by the fan; the air intake plenum of each of the plurality of air handling systems including at least a part thereof mounted underneath the respective one of the plurality of benches and comprising a generally rectangular structure defined by upstanding side walls and having a bottom portion for contacting a floor and a top portion providing support for the respective bench so as to transfer weight from the bench to the floor

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Art Unit: 3643

***Conclusion***

Included with this office action is a translation in English of JP2000-698858 to Takano.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jeffrey L. Gellner whose telephone number is 571.272.6887. The examiner can normally be reached on Monday-Friday, 8:30-4:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Peter Poon can be reached on 571.272.6891. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

A handwritten signature in black ink, appearing to read 'J. L. Gellner', with stylized, overlapping strokes.

Jeffrey L. Gellner  
Primary Examiner  
Art Unit 3643

PTO 05-2102 HAMT

Japanese Patent  
Document No. 12-069858

**GREENHOUSE CULTIVATION METHOD OF PLANT AND DEVICE THEREFOR**

[□□□□□□□□□□□□□□]

Takano, Satoshi

UNITED STATES PATENT AND TRADEMARK OFFICE  
Washington, D.C. February 2005

Translated by: Schreiber Translations, Inc.

(19) [Publication Office]

Japan Patent Office (JP)

(12) [Kind of Document]

Unexamined Patent Publication (A)

(11) [Publication Number of Unexamined Application]

Japan Unexamined Patent Publication 2000-69858 (P2000-69858A)

(43) [Publication Date of Unexamined Application]

2000 March 7 (2000.3.7)

(43) [Publication Date of Unexamined Application]

2000 March 7 (2000.3.7)

(54) [Title of Invention]

**GREENHOUSE CULTIVATION METHOD OF PLANT AND DEVICE THEREFOR**

(51) [International Patent Classification, 7th Edition]

A01G 9/24

14-Sep

18-Sep

[FI]

A01G 9/24 A

G

J

X

9/14 W

18-Sep

[Number of Claims]

19

[Form of Application]

FD

[Number of Pages in Document]

10

[Theme Code (For Reference)]

2B029

[F Term (For Reference)]

2B029 AA01 FA03 FA07 FA15 JA02 NB10 PA03 RA06 SA01 SB09  
XA10

[Request for Examination]

Not yet requested

(21) [Application Number]

Japan Patent Application Hei 10-218634

(22) [Application Date]

1998 July 16 (1998.7.16)

(71) [Applicant]

[Identification Number]

398043805

[Name]

**TAKANO, SATOSHI**

[Address]

4-2-3-203 Waseda, Misato City, Saitama Prefecture

(72) [Inventor]

[Name]

Takano, Satoshi

[Address]

4-2-3-203 Waseda, Misato City, Saitama Prefecture

(74) [Attorney(s) Representing All Applicants]

[Identification Number]

100074251

[Patent Attorney]

[Name]

Harada, Yutaka

(57) [Abstract]

[Problems to be Solved by the Invention]

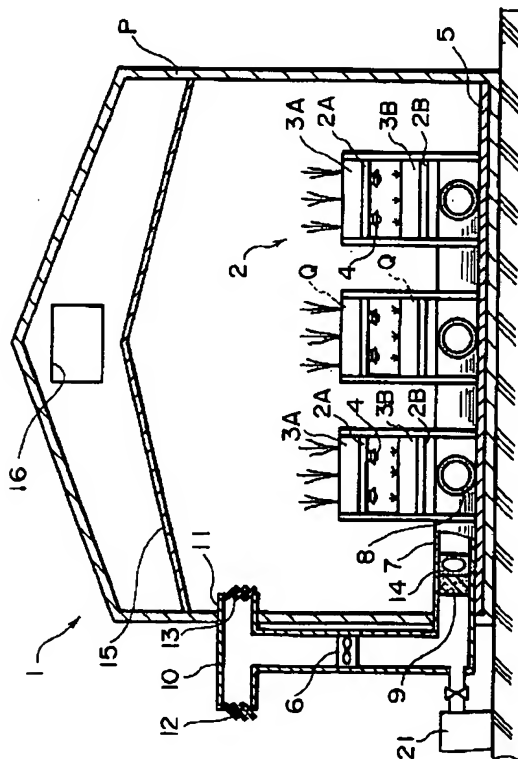
To enable the prevention of propagation of pests such as sundry germs at the earth floor inside a clean green house, the avoidance of the influence of outer weather and the obtaining of stable harvest the year round.

[Means to Solve the Problems]

The earth floor inside a clean green house P is covered with a waterproof sheet 5, and a main duct 7 for taking-in outer air having an introducing fan 6 and plural clean air-supplying branch ducts 8 which are all connected to the main ducts through a filter 9 for filtering the outer air introduced into the main duct by the introducing fan 6 are placed inside the clean green house P. The branch ducts 8 are each extended and placed below a culturing circulating apparatus 2 of a multi-staged bench structure, which is placed inside the clean green house P, for placing

cultivation containers Q.

The cultivation circulation apparatus 2 comprises a lower stage pool 3B for the seedling raising period, which moves the cultivation container Q to the downstream side with the flow due to buoyancy by pouring water into the culturing circulating apparatus 2 and bringing it into a water filled state, and an upper stage pool 3A, which is placed above the lower stage pool 3B. The upper stage pool 3A moves the cultivation container Q, whose raising of seedlings is completed, to the upstream side from the downstream side. When the cultivation container Q flows and reaches the downstream side, it is kept there until the plants grow up to the state they are ready for harvesting.



[Claim(s)]

[Claim 1]

The greenhouse cultivation approach of the vegetation characterized by performing seedling raising and cultivation of vegetation with the cultivation circulation system of two or more step type bench structure made to install in this clean greenhouse in the clean greenhouse of



the complete rebreathing system of the installation to the under outdoor sunlight.

[Claim 2]

the greenhouse cultivation approach of the vegetation which installed the cultivation circulation system of two or more step type bench structure in the clean greenhouse of the complete rebreathing system which perform seedling raising and cultivation of vegetation in the greenhouse under the outdoor sunlight, and be characterized by to make clean air introduce in a clean greenhouse through the branch duct which plurality be branched and carried out extension installation from the main duct for open air introduction by which the introductory fan be equipped in this clean greenhouse.

[Claim 3]

With atmospheric conditions of clean greenhouse inside and outside, as for aforementioned introduction fan and main duct, branch duct clean air inside clean greenhouse the greenhouse cultivation method. of plant which is stated in Claim 2 which circulates

[Claim 4]

It allots cold moist heat source to main duct, branch duct, passing by main duct and branch duct to winter by changing cooling source, moist heat source respectively, it utilizes as heater device which supplies hot air inside clean greenhouse, Passing by both duct in same way to summer, greenhouse cultivation method. of the plant which it states in Claim 2 or 3 which it utilizes as air conditioning equipment which supplies cool air

[Claim 5]

greenhouse cultivation method. of plant which is stated in introduction fan and any of Claim 2 to 4 which utilizes main duct, branch duct in supply of carbon dioxide gas

[Claim 6]

In lower stage pool at time of seedling of lower stage bench side of cultivation circulation apparatus of top and bottom two-stage type bench structure which inside

greenhouse under outdoor sunlight is installed in the seedling of plant and inside clean greenhouse of closed linear which does cultivation, mounting cultivation container which plant which germination has been done rooting is done, water injection doing water inside lower stage pool, it makes sprinkling state, Riding in flow due to buoyancy, moving cultivation container to downstream side, when seedling ends with downstream side of lower stage pool, cultivation container the occasion where after moving, cultivation container flows to downstream side of upper stage pool in upstream side of upper stage pool when growing upper stage bench side and arrives, as for plant harvesting greenhouse cultivation method. of plant which designates that to possibly it tries to grow as feature

[Claim 7]

At time of sprinkling at other than in aforementioned upper stage and lower stage pool the water injection water which is done in water storage tank wastewater greenhouse cultivation method. of the plant which is stated in Claim 6 which recovers

[Claim 8]

greenhouse cultivation device. of plant which designates that it has cultivation circulation apparatus of the multiple stage type bench structure which is installed inside clean greenhouse rooting is done clean greenhouse and plant of closed linear which is installed under outdoor sunlight to move cultivation container of plural which cultivated soil which is accommodated at time of sprinkling inside pool as feature

[Claim 9]

In order seedling of plant and clean greenhouse and said clean greenhouse of the closed linear which does cultivation to prevent pollution from the space inside greenhouse under outdoor sunlight, is installed in the cultivation circulation apparatus and clean greenhouse of multiple stage type bench structure for cultivation container mount which is installed inside waterproof sheet and clean greenhouse which space shield are done, Passing by filter which filters external air which is introduced by main duct and introduction fan for external air adopting to which introduction fan is equipped, from main duct the

branch connecting to multiple, in underside of  
aforementioned cultivation circulation apparatus drawing  
greenhouse cultivation device. of plant which designates  
that it possesses branch duct for clean air supply which is  
installed as feature

[Claim 10]

cultivation circulation apparatus, mounting cultivation  
container which plant which germination has been done  
rooting is done, water injection doing water makes  
sprinkling state, riding in flow due to buoyancy, it is  
installed cultivation container in the lower stage pool at  
time of seedling which it moves to downstream side and the  
upward direction of said lower stage pool, cultivation  
container where seedling ends with downstream side of said  
lower stage pool is moved is mounted with upstream side,  
Occasion where cultivation container flows to downstream  
side and arrives plant harvesting greenhouse cultivation  
device. of plant which is stated in Claim 8 or 9 which is  
made those of top and bottom two-stage type bench structure  
which has upper stage pool when growing which to possibly  
grows

[Claim 11]

Way aforementioned cultivation container, in order for  
water from bottom surface to be supplied to uniform to  
cultivation container interior, forms bottom in mesh, root  
part of plant of cultivation container interior comes in  
contact with air and necessary oxygen is supplied, in  
interior surface greenhouse cultivation device. of the  
plant which is stated in any of Claim 8 to 10 which it lays  
arranges nonwoven fabric

[Claim 12]

In aforementioned cultivation container, when inside of  
each pool becomes the water depth of fixed water level,  
greenhouse cultivation device. of plant which is stated in  
any of Claim 8 to 11 where buoyancy device which designates  
cultivation container entirety as raised portion movable is  
installed

[Claim 13]

In lower face of upper stage pool, when being insufficiency

of light intensity in lower stage pool, greenhouse cultivation device. of plant which is stated in any of the Claim 9 to 12 where light supplement device which irradiates close distance light supplement is allotted to mountable

[Claim 14]

To provide air intake part inside greenhouse which connects external air intake part and the other end opening side which direct one end opening side to outward direction to inside clean greenhouse in the main duct for external air adopting which is allotted to outside of clean greenhouse, respectively opening and closing type damper being equipped in air intake part inside external air intake part and greenhouse, case of internal air circulation closing opening and closing type damper of external air intake part side, In addition at time of external air intake as for opening and closing type damper of air intake part side inside greenhouse cultivation device. of plant which is stated in any of Claim 8 to 13 are closed

[Claim 15]

In main duct, branch duct respectively, in winter cold moist heat source device which is changed with to cooling source which is made air conditioning equipment which supplies cool air in same way to moist heat source and summer which are made heater device which supplies hot air inside greenhouse making use of main duct and branch duct from both duct is mounted, greenhouse cultivation device. of plant which is stated in any of Claim 8 to 14 which in growth space of plant when air-conditioning it tries to keep warm lump regions at time of heater, to keep cold lump regions

[Claim 16]

Transmitting sunlight, greenhouse cultivation device. of plant which it states in the any of Claim 8 to 15 which in order damage or to become opening possible on ceiling side inside clean greenhouse, arranges temperature-holding curtain which at same time possesses temperature-holding power of moist heat, cooling

[Claim 17]

On ceiling side of clean greenhouse, greenhouse cultivation device. of plant which is stated in any of Claim 8 to 16 where wind pressure damper which amount of air which is suitable to external air quantity which is introduced exhaust is done is mounted

[Claim 18]

After, sterilization doing seedling and fixture, material, etc., which is used for cultivation on corner of clean greenhouse, greenhouse cultivation device. of plant which it states in any of Claim 8 to 17 where sterilization room which it carries into clean greenhouse is provided

[Claim 19]

In site being adjacent to sterilization room, cultivated soil greenhouse cultivation device. of plant which is stated in any of Claim 8 to 18 cultivated soil sterilizing device of the pair which cultivation container which is filled heat sterilization is done adjacent is installed, on one hand cultivated soil sterilizing device during heat sterilization treatment, as for the cultivated soil sterilizing device of other do cooling to proper temperature at time of rooting of cultivated plant

[Description of the Invention]

[0001]

[Technological Field of Invention]

this invention inside greenhouse under outdoor sunlight makes seedling and the cultivation of plant possible without using pesticide for insecticidal sterilization by maintaining environment inside greenhouse at clean, in addition also mechanization is possible, is greenhouse cultivation method of plant and something regarding device with clean greenhouse which it tries to be able to do with light work.

[0002]

[Prior Art]

Until recently, with greenhouse for plant cultivation sky light, side window is opened and closed and ventilation is

done.

Because of that, when making state which opened sky light, side window, there was a thing where pathogenic insect, etc., invades from outside, when pathogenic insect, etc., invaded from outside, as prevention countermeasure, it had made that scattering fabric of pesticide is done unavoidable.

In addition, recently, plant correct normally gives water which includes element which is necessary in order to grow, the soil is not used and non soil cultivation, nurturing liquid cultivation, hydroponics or other generally known hydroponic cultivation is done cultivation is done plant as system which, with respect to, for example, sphere root plant.

In addition, system, sand which soaks root directly in the aqueous solution, pebbles, vermiculite (DANA 71.2.2d.3), there is a system, etc., which makes root inert material stretch in sawdust or other chemical in hydroponic cultivation.

Because, root breathing, consumes oxygen regarding hydroponic cultivation a this way, circulating, providing step on middle, system which such as makes waterfall doing, makes underwater oxygen the culture medium fuse has been taken culture fluid between, for example, cultivation water tank and water supply tank.

[0003]

[Problems to be Solved by the Invention]

But, those which with conventional greenhouse, as for pathogenic insect or other prevention we have solved with use of pesticide, give a some adverse effect directly cultivation with respect to plant which is reared.

In addition, nurturing liquid cultivation with such as conventional hydroponic cultivation system fact that it has supplied to plant with chemical fertilizer as culture fluid being actual condition, at time of this, in order to make underwater oxygen culture medium fuse or other manual and mechanical operation which circulates normally is required culture fluid between cultivation water tank and water supply tank through year, Agriculture and technology

equipment non- being normally complicated, as it becomes expensive, there to be a deficiency that also loaded surface area which is required in cultivation rearing increases, furthermore environment adjustment for cultivation rearing of plant usual must be maintained, farm work was made non- normally difficult ones.

Furthermore influence was received to outside weather largely even with end agriculture as infrastructure horticulture a this way, stability harvesting through the year non- had normally difficult aspect..

[0004]

Then, as description above you consider this invention, to situation which existence are done until recently and being something which is created, preventing propagation of germs or other pathogenic insect of space, in addition doing farm work easily and simply even such as old person, women you are possible, furthermore on outside weather it does not have an influence, you do harvesting which is stabilized through year is acquired, greenhouse cultivation method of plant and that device is offered are designated as objective with clean greenhouse where also mechanization is possible.

[0005]

[Means to Solve the Problems]

In order to achieve objective which description above is done, there being a greenhouse cultivation method of plant which relates to this invention, under the outdoor sunlight inside clean greenhouse P of closed linear of installation, by the seedling of plant and fact that cultivation is done, more concrete with cultivation circulation apparatus 2 of multiple stage type bench structure which is installed inside the said clean greenhouse P, Inside greenhouse under outdoor sunlight cultivation circulation apparatus 2 of multiple stage type bench structure is installed in seedling of plant and inside clean greenhouse P of closed linear which does cultivation, inside said clean greenhouse P, from main duct 7 for external air adopting to which introduction fan 6 is equipped the branch doing in plural, drawing through branch duct 8 which it installs, by fact that it introduces clean air into clean greenhouse P, As it tries to prevent propagation of germs by fact that space

inside clean greenhouse P is maintained at regular dry state, the drawing through branch duct 8 which is installed in underside of the cultivation circulation apparatus 2, introduce clean air into clean greenhouse P.

By atmospheric conditions of clean greenhouse P inside and outside, as for aforementioned introduction fan 6 and main duct 7, branch duct 8 clean air inside clean greenhouse P circulate.

We utilize as air conditioning equipment where it allots cold moist heat source to main duct 7, branch duct 8, passing by main duct 7 and branch duct 8 to winter by changing cooling source, moist heat source respectively, it utilizes passes by both duct 7, 8 in same way to summer and supplies cool air as the heater device which supplies hot air inside clean greenhouse P.

It is made introduction fan 6 and utilizes main duct 7, branch duct 8 in supply of carbon dioxide gas.

In lower stage pool 3B at time of seedling of lower stage bench 2 side B of cultivation circulation apparatus 2 of the top and bottom two-stage type bench structure which inside greenhouse P under outdoor sunlight is installed in seedling of plant and inside clean greenhouse P of closed linear which does the cultivation, mounting cultivation container Q which plant which germination has been done rooting is done, water injection doing water inside lower stage pool 3B, it makes sprinkling state, Riding in flow due to buoyancy, moving cultivation container Q to downstream side, when seedling ends with downstream side of lower stage pool 3B, cultivation container Q the occasion where after moving, cultivation container flows to downstream side of upper stage pool 3A in upstream side of upper stage pool 3A when growing upper stage bench 2 side A and arrives, as for plant to harvesting possibly try to grow.

At time of sprinkling at other than in aforementioned upper stage and lower stage pool 3A, 3B the water which water injection is done wastewater recover in water storage tank.

On one hand, there being a greenhouse cultivation device 1 of plant which relates to the this invention, by fact that it has cultivation circulation apparatus 2 of multiple stage type bench structure which is installed inside clean



greenhouse P to move cultivation container Q of plural which the cultivated soil T which rooting it does clean greenhouse P and plant of closed linear which is installed under outdoor sunlight is accommodated at time of sprinkling inside pool 3A, 3B, more concrete, In order seedling of plant and clean greenhouse P and said clean greenhouse P of the closed linear which does cultivation to prevent pollution from the space inside greenhouse under outdoor sunlight, is installed in the cultivation circulation apparatus 2 and clean greenhouse P of top and bottom two-stage type bench structure for cultivation container Q mount which is installed inside waterproof sheet 5 and clean greenhouse P which space shield are done, Passing by filter 9 which filters external air which is introduced by main duct 7 and introduction fan 6 for external air adopting to which introduction fan 6 is equipped, from main duct 7 the branch connecting to multiple, drawing it is made configuration which possesses branch duct 8 for clean air supply which is installed in the underside of aforementioned cultivation circulation apparatus 2.

cultivation circulation apparatus 2 of top and bottom two-stage type bench structure, mounting cultivation container Q which plant which the germination has been done rooting is done, water injection doing water makes sprinkling state, riding in flow due to buoyancy, it is installed the cultivation container Q in lower stage pool 3B at time of seedling which it moves to the downstream side and upward direction of said lower stage pool 3B, cultivation container Q where seedling ends with downstream side of said lower stage pool 3B is moved is mounted with upstream side, plant can be designated as configuration which has upper stage pool 3A when growing which to harvesting possibly grows occasion where the cultivation container Q flows to downstream side and arrives.

In order aforementioned cultivation container Q, in order for water from the bottom surface to be supplied to uniform to cultivation container Q interior, forms bottom in the mesh, root part of plant of cultivation container Q interior comes in contact with the air and for necessary oxygen to be supplied, as configuration which it lays arranges nonwoven fabric S can be designated to interior surface.

When inside of each pool 3A, 3B becomes water depth of

fixed water level, it can designate to aforementioned cultivation container Q, as configuration where the buoyancy device R which designates cultivation container Q entirely as raised portion movable is installed.

When being insufficiency of light intensity in lower stage pool 3B, it can designate to lower face of upper stage pool, as configuration where light supplement device 4 which irradiates close distance light supplement is allotted to the mountable.

To provide air intake part 11 inside greenhouse which connects external air intake part 10 and the other end opening side which direct one end opening side to outward direction to inside clean greenhouse P in the main duct 7 for external air adopting which is allotted to outside of clean greenhouse P, respectively opening and closing type damper 12, 13 being equipped in air intake part 11 inside external air intake part 10 and greenhouse, case of internal air circulation closing opening and closing type damper 12 of external air intake part 10 side, In addition at time of external air intake as for opening and closing type damper 13 of air intake part 11 side inside greenhouse it can make configuration which is closed.

In main duct 7, branch duct 8 respectively, in winter in moist heat source and the summer which are made heater device which supplies hot air inside the greenhouse making use of main duct 7 and branch duct 8 cold moist heat source device 14 which is changed with to cooling source which is made the air conditioning equipment which supplies cool air from both duct 7, 8 is mounted, In growth space of plant you keep warm lump regions at time of heater, you can make configuration which it tries to keep cold lump regions when air-conditioning.

Transmitting sunlight, it can make configuration which in order damage or to become opening possible on ceiling side inside the clean greenhouse P, arranges temperature-holding curtain 15 which at same time possesses temperature-holding power of moist heat, cooling.

On ceiling side of clean greenhouse P, exhaust is done amount of air which is suitable to external air quantity which is introduced as wind pressure damper 16 which is mounted, in addition, after, sterilization doing seedling and the fixture, material, etc., which is used for

cultivation on corner of clean greenhouse P, it can make configuration which provides sterilization room 17 which it carries into clean greenhouse P.

Furthermore, cultivated soil sterilizing device 18A, 18B of pair which cultivation container Q which is filled heat sterilization is done adjacent to be installed in site which is adjacent to sterilization room 17, on one hand cultivated soil sterilizing device 18A during heat sterilization treatment, can designate cultivated soil sterilizing device 18B of other as configuration do the cooling to proper temperature at time of rooting of cultivated plant.

[0006]

Like above mounting cultivation container Q which plant which germination has been done rooting is done, water occasion where water injection it is done, riding in flow cultivation container Q due to buoyancy, it moves the lower stage pool 3B at time of seedling in cultivation circulation apparatus 2 of top and bottom two-stage type bench structure in greenhouse cultivation method and device of plant which relates to this invention which configuration is done, to downstream side.

When and, seedling ends with downstream side of said lower stage pool 3B, moving mounting cultivation container Q in upper stage pool 3A upstream side when growing, cultivation container Q flows to downstream side of upper stage pool 3A and when arriving, plant to harvesting possibly grows.

If at time of this, buoyancy device R of cultivation container Q, inside of each pool 3A, 3B being done, sprinkling becomes water depth of fixed water level, it makes cultivation container Q entirety come up and rides in flow of water and this on each pool 3A, 3B makes movable.

As for waterproof sheet 5 which is laid inside clean greenhouse P, preventing pollution with germs from space, in addition, it dries converts inside clean greenhouse P.

Main duct 7 filtering external air which is introduced due to the introduction fan 6 due to filter 9, introducing into clean greenhouse P with state which it makes clean air, diverging from main duct 7, is supplied inside clean greenhouse P by branch duct 8 which is laid in the

cultivation circulation apparatus 2 underside.

When light intensity being insufficiency in lower stage pool 3B, close distance light supplement uniform it irradiates light supplement device 4 which is mounted in lower face of upper stage pool 3A, on lower stage pool 3B.

Due to atmospheric conditions of clean greenhouse P inside and outside, introduction fan 6 and main duct 7, branch duct 8 circulate clean air inside clean greenhouse P.

At time of this, case of internal air circulation opening and closing type damper 12 of external air intake part 10 is closed, in addition at time of external air intake as for the opening and closing type damper 13 of air intake part 11 inside greenhouse is closed.

It becomes heater device which supplies hot air equally inside greenhouse in winter by changing respectively cooling source, moist heat source, as air conditioning equipment it utilizes the cold moist heat source device 14, in summer.

In order to cover ceiling side inside clean greenhouse P, in winter warm lump regions, keeping cold lump regions in summer, it makes temperature-holding curtain 15 be accustomed which is arranged, to moving aside time of the weather which does not have necessity of temperature-holding to one side.

exhaust doing amount of air which is suitable to external air quantity which is introduced, at time of clean air circulation inside clean greenhouse P it designates wind pressure damper 16 of exhaust which is mounted on ceiling side of clean greenhouse P, as state while it is closed.

seedling and fixture, material, etc., which is used for cultivation sterilization it does sterilization room 17 inside clean greenhouse P.

As for cultivated soil sterilizing device 18A, 18B of pair inside clean greenhouse P, cultivated soil heat sterilization doing cultivation container Q which is filled in dedicated, on one hand cultivated soil sterilizing device 18A during heat sterilization treatment, as for cultivated soil sterilizing device 18B of other does cooling to proper temperature at time of rooting of

cultivated plant.

[0007]

[Embodiment of the Invention]

Below, referring to drawing, explains embodiment of this invention, the symbol 1 which is shown in figure way with organic cultivation, inside the greenhouse under outdoor sunlight seedling and cultivation of plant are made possible without using pesticide for insecticidal sterilization by maintaining the environment inside greenhouse at clean, It is a greenhouse cultivation device which has clean greenhouse P which installs cultivation circulation apparatus 2 in the interior.

As for said clean greenhouse P it is made closed type greenhouse structure which does not use sky light and side window, it is possible and can assure increase of the yield to utilize carbon dioxide gas through year.

Furthermore configuration of clean greenhouse P is thought dome type, gable type, fenlo type and pipe greenhouse type, other configuration, but configuration is good any ones.

[0008]

In addition, cultivation circulation apparatus 2, as shown in Figure 1, Figure 2, Figure 4, configuration has been done, for example, upper stage bench 2A and lower stage bench 2B long and narrow in table structure which is made the multiple stage structure like top and bottom two-stage structure which is supported with frame which possesses suitable post like, for example, exemplary diagram putting between duct to beam side, parataxis is installed in triplex rows.

In addition, storing fixed water in upper stage bench 2A in said cultivation circulation apparatus 2, when growing upper stage pool 3A which you use, lower stage pool 3B which uses fixed water at time of seedling respectively being mounted individually in the lower stage bench 2B, it was filled was accommodated cultivated soil T where organic component is contained it is done cultivation container Q which it mentions later moves inside each pool 3A, 3B.

In reverse direction having mutually with mild gradient

namely, upper stage pool 3A and lower stage pool 3B alongside longitudinal direction, case where we have inclined, at time of water doing water injection store fixed water to each pool 3A, 3B with the pump, after passage of a certain time wastewater we try to recover in water storage tank which abbreviates illustration, furthermore water injection we are done at time of sprinkling, cultivation container Q which has buoyancy device R which it mentions later multiply in the buoyancy, riding in water stream, try to be able to move to downstream side.

Furthermore without providing gradient, with respect to each pool 3A, 3B it is good moving cultivation container Q with operate pushing force with such as hand gilding.

[0009]

And, branch duct 8 which diverges from main duct 7 which it mentions later drawing is installed in lower stage bench 2B underside of cultivation circulation apparatus 2.

In addition, as shown in Figure 4, when light intensity being insufficiency in lower stage pool 3B, in order close distance light supplement uniform to be able to irradiate on lower stage pool 3B with such as fluorescent tube, light supplement device 4 is equipped in lower face of upper stage pool 3A, in addition when, it is unnecessary, tries to be able to stop lighting by fact that the off it does power switch, When depending, try to be able to withdraw light supplement device 4 easily.

[0010]

As shown in Figure 3, as for aforementioned cultivation container Q having become box of plane rectangular, single stage in order to form buoyancy or the buoyancy device R of float type of multiple stage configuration to be installed in periphery, When it becomes water depth of fixed water level which is each pool 3A, 3B the cultivation container Q entirety raised portion we move in water surface by buoyancy device R which is installed in periphery of cultivation container Q.

At time of this, size of cultivation container Q possessing length of side edge which is suitable to width member of each pool 3A, 3B, being mounted or possessing length of

side edge of approximately half of width member of each pool 3A, 3B in single line, adjacent it mounts to 2 lines such as to be done, furthermore as for total length of each pool 3A, 3B, Riding in water stream, it is set to length which corresponds during harvesting & growth period of plant inside cultivation container Q which it moves.

Concretely, inside each pool 3A, 3B, for example, 10 to 20 cultivation container Q of the extent lining up and mounting to order, some day applying and in the degree which it makes sprinkling state sequential moving on water surface inside each pool 3A, 3B, after removing cultivation container Q which had become growth end, novel ones of cultivation container Q it mounts in space where inside of each pool 3A, 3B is less crowded.

Because movement of cultivation container Q on each pool 3A, 3B a this way is done, adjusting to seedling time and harvest time of plant, timing, in combination also with mobility of cultivation container Q and total length, etc., of each pool 3A, 3B to seedling time and harvest time of plant, it is set beforehand.

Furthermore it is done with worker or other direct manual operation from lower stage pool 3B incase of movement and transfer of facilities, etc., to upper stage pool 3A, or with mechanical motion means which abbreviates illustration try to be done in the automatic.

From first, also is good at time of movement of cultivation container Q in interior of each pool 3A, 3B respectively making thing with mechanical motion means it is something which.

[0011]

In addition, if in each pool 3A, 3B water which water injection is done the floating we move cultivation container Q at time of sprinkling inside each pool 3A, 3B, it is good, it has become something where usually tap water, underground water, etc., is used.

Simply in that or other water, by fact that, for example, nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, chlorine, manganese, boron, zinc, copper, molybdenum, etc., which is a element which is necessary in order correct normally to grow plant is contained, they are

good ones even by fact that it makes the culture water for hydroponic cultivation.

At time of this, as for cultivation container Q bottom surface of box having become mesh bottom U, as for water passing by cultivated soil T from bottom surface, or try to be supplied to uniform to plant inside cultivation container Q directly.

In addition, as nonwoven fabric S attaches to interior surface of cultivation container Q and others is and root part of plant when water doing ends, that tries comes in contact with air directly can acquire the necessary oxygen through nonwoven fabric S, because of that in Figure 3 (b) shown, forming relief part on bottom surface of each pool 3A, 3B, It is something which air layer that tries is formed to cultivation container Q lower face at time of wastewater.

[0012]

As shown in Figure 1, laying waterproof sheet 5 in space entire surface as one for soiling prevention from space inside clean greenhouse P, space shield is done with said waterproof sheet 5, by fact that it maintains under waterproof sheet 5 at the regular dry state, tries to prevent propagation of germs of the space.

[0013]

As shown in Figure 1, Figure 2, main duct 7 for external air adopting to which introduction fan 6 which possesses necessary volume is equipped is installed in, for example, side wall amount inside clean greenhouse P, branch connecting branch duct 8 of plural, for example, 3 from said main duct 7 in clean greenhouse P interior, drawing is installed in underside of lower stage bench 2B in aforementioned cultivation circulation apparatus 2.

Putting suitable spacing on said branch duct 8, blowing orifice 8A of clean air being installed and being formed in upper part, side etc.

Case of external air adopting, after as for external air which is absorbed inside main duct 7 by introduction fan 6, being once filtered with filter 9, to clean air passing by branch duct 8 which is laid under bench 2 of respectively,



preferably equally it introduces supplies inside clean greenhouse P.

At time of this as for performance of filter 9 are selected according to cleanliness which is required inside clean greenhouse P.

Furthermore as for this branch duct 8 when it is arranged in the lower stage bench 2B lower in cultivation circulation apparatus 2 there are also times when it is arranged with the suitable position inside or other clean greenhouse P alongside sidewall interior surface of limit and cultivation circulation apparatus 2 or other side direction, clean greenhouse P.

[0014]

In addition, above-mentioned introduction fan 6 and main duct 7, branch duct 8 are utilized clean air inside clean greenhouse P even in circulating by atmospheric conditions of clean greenhouse P inside and outside.

As shown in namely, Figure 1, to form air intake part 11 inside greenhouse which connects external air intake part 10 and other end opening side which direct one end opening side to outward direction to inside clean greenhouse P in top end of main duct 7 for external air adopting which is allotted to outside of clean greenhouse P, in the abbreviation T-shaped opening and closing type damper 12, 13 of, for example, respectively electric type being equipped in air intake part 11 inside external air intake part 10 and greenhouse, Case of internal air circulation opening and closing type damper 12 of external air intake part 10 is closed, in addition at time of external air intake as for opening and closing type damper 13 of air intake part 11 inside greenhouse are closed.

Furthermore as for introduction fan 6 and main duct 7, branch duct 8 it is possible, are utilized even in supply of carbon dioxide gas it is designed in such a way that it is supplied with carbon dioxide gas application device 21 which is connected to main duct 7 part amount outside, for example, clean greenhouse P.

[0015]

In addition, as shown in Figure 1, Figure 2, in interior of

main duct 7, branch duct 8 directly or it mounts cold moist heat source device 14 with indirect system, making use of main duct 7 and branch duct 8 supplies hot air equally inside clean greenhouse P it becomes heater device which in winter by changing respectively cooling source, moist heat source, We can utilize as air conditioning equipment which supplies cool air in same way to summer from both duct 7, 8.

In case of this, when using heater device, air conditioning equipment, if it is not necessary to designate volume entirety of greenhouse as object limits and in growth space of plant at time of heater warm lump regions, keeps cold lump regions when air-conditioning it is good.

As, for example, concrete constitution, it transmits sunlight, but at time of weather which in order to cover ceiling side inside clean greenhouse P, arranges the temperature-holding curtain 15 which is superior in temperature-holding power of moist heat, cooling, does not have the necessity of temperature-holding are moved aside to one side, in winter warm lump regions try to keep cold lump regions in summer.

[0016]

As for clean greenhouse P, as for sky light, side window, eaves window or other air circulation equipment it is made configuration which is not mounted, but as shown in Figure 1, as for amount of air which is suitable to external air where wind pressure damper 16 of exhaust is mounted beforehand on ceiling side of clean greenhouse P, introduces from this wind pressure damper 16 the exhaust are done to clean greenhouse P outside.

At time of this, state while it is closed at time of clean air circulation which before inside clean greenhouse P was inscribed as for wind pressure damper 16 of exhaust it is made.

Furthermore wind pressure damper 16 is protected because influence of outside weather is not received with protective equipment (not shown).

[0017]

As shown in Figure 2, after, sterilization doing seedling

and fixture, material, etc., which is used for cultivation on corner of clean greenhouse P, sterilization room 17 in order to carry into clean greenhouse P is provided, in order to prevent the invasion of germs from external air, in outside (dirty area) of said sterilization room 17 opens and closes door which surface is done from only the outside, In clean greenhouse P interior (clean area) as for door which surface is done, from only interior it is made interlock configuration which cannot be opened and closed.

[0018]

In addition, in place where it is adjacent to sterilization room 17 inside clean greenhouse P, cultivated soil T cultivated soil sterilizing device 18A, 18B of pair which possesses the same performance in order heat sterilization to do cultivation container Q which is filled the adjacent is installed, on one hand cultivated soil sterilizing device 18A during heat sterilization treatment, as for cultivated soil sterilizing device 18B of other do cooling to proper temperature at time of rooting of cultivated plant.

Furthermore as for cultivated soil T, various organic component which are needed for the growth of plant can be contained go hand in hand with fact that content formation, etc., of organic matter for this cultivated soil T cultivation container Q itself is sufficient miniature do simply with stirring apparatus of miniature organic component is contained at time of.

[0019]

In addition, as shown in Figure 2, air shower room 19 is provided on corner of clean greenhouse P, worker which engages to job inside clean greenhouse P puts, clean work clothing which sterilization is done beforehand entrance room we do inside clean greenhouse P via this air shower room 19.

20 is cold storage in order to keep plant which is harvested.

[0020]

Next, explains one example of use of this invention, worker which engages to job inside clean greenhouse P when morning

you go to work, clean work clothing which sterilization is done beforehand to put, entrance room it does inside clean greenhouse P via air shower room 19.

cultivated soil T it has become state where cultivation vessel Q which is filled systematically lines up into single line or 2 lines in lower stage pool 3B respectively at time of upper stage pool 3A, seedling when growing on cultivation circulation apparatus 2.

At time of this cultivation container Q which is filled, for example, preceding day heat treatment is done cultivated soil T with cultivated soil sterilizing device 18A, 18B of dedicated and eve is cooled to proper temperature of rooting.

In addition, fixture and material, etc., which are used for cultivation are carried in yesterday sterilization room and 17 sterilization are done, the sterilization after being done, are carried from door of clean greenhouse P interior.

Next, opening door of clean greenhouse P interior, it puts out cultivation container Q which the cooling is done, it removes plant which germination has been done from germination device (not shown) and rooting does in cultivation container Q.

As and, shown in Figure 4, it mounts cultivation container Q which rooting is done in lower stage pool 3 side B at time of seedling of cultivation circulation apparatus 2 of greenhouse cultivation device 1.

When at time of this, insufficient being light intensity in the lower stage pool 3B, close distance light supplement is irradiated with fluorescent tube with the light supplement device 4.

[0021]

Water you do and or when moving cultivation container Q, water being the pump in upper stage pool 3A, lower stage pool 3B respectively, water injection you are done.

At time of this, cultivation container Q, water being done, water injection when it touches to that water occasion where it has become the sprinkling state with buoyancy device R in order for buoyancy to work, because it is

administered, riding in flow, moves cultivation container Q which is inserted to downstream side.

After that, water of upper stage pool 3A, lower stage pool 3B respectively wastewater recovers in water storage tank to after passage of a certain time.

Concretely, for example, 10 to 20 cultivation container Q of extent lining up and mounting to order inside upper stage pool 3A, lower stage pool 3B, some day applying and in the degree which it makes sprinkling state on water surface inside upper stage pool 3A, lower stage pool 3B the sequential moving to downstream side, although it removes cultivation container Q which has become growth end from upper stage pool 3A In upstream side of upper stage pool 3A having cultivation container Q of downstream side of lower stage pool 3B with manual operation of worker, as it moves mounts, it mounts novel ones of cultivation container Q in space where inside of lower stage pool 3B is less crowded.

for example 10 where seedling which is removed from lower stage pool 3B ends the to 20 cultivation container Q of extent lining up and mounting to order inside namely, upper stage pool 3A, some day applying and in degree which it makes the sprinkling state on water surface inside upper stage pool 3A sequential moving to downstream side, after removing cultivation container Q which had become harvest time, Removing cultivation container Q where seedling ends from lower stage pool 3B, it mounts in space where inside of lower stage pool 3B is less crowded.

Movement of cultivation container Q on each pool 3A, 3B a this way is done, adjusting to seedling time and harvest time of plant, timing.

this way water of upper stage bench 2A wears to downstream side of upper stage pool 3A which water injection is done and plant to harvesting possibly grows between with dark circle, as for finally cultivation container Q where in downstream side of upper stage pool 3A plant becomes harvest time flows and has arrived.

After that, plant of harvesting possibility every cultivation container Q is carried by harvesting workplace, as for worker after placing cultivation container Q in harvesting work platform, plant which is harvested after weighing, being inserted by film bag, every container waits

for shipment with the cold storage 20.

[0022]

Furthermore top and bottom layout configuration it is good doing upper stage bench 2A, lower stage bench 2B, upper stage pool 3A, lower stage pool 3B, etc., conversely in above-mentioned cultivation circulation apparatus 2.

Furthermore illustration was abbreviated, but configuration it does these each bench 2A, 2B, each pool 3A, 3B, etc., in top and bottom two-stage, furthermore, configuration to do, it to be possible also in multiple stage of 3 stages or more of odd number or the even number At that case motion system road of cultivation container Q in configuration stage position of respectively or plant which to same growth state is using for sequential those of the stage position of plural as 1 -set collecting, as it arranges moves is good ones.

[0023]

[Effects of the Invention]

As though it is above, according to this invention, because under outdoor sunlight inside clean greenhouse P of closed linear of installation, it made the seedling of plant and to do cultivation with cultivation circulation apparatus 2 of multiple stage type bench structure which is installed inside said clean greenhouse P, be able to prevent the propagation of germs or other pathogenic insect of space in clean greenhouse P interior, it does not have an influence on outside weather, It is possible stable harvesting is acquired through year.

In addition, temperature of greenhouse interior of especially summer becomes high, by designating greenhouse as closed linear, but not to be to designate volume of greenhouse entirety as environment adjustment space, regarding to winter, with only growth space of plant as the environment adjustment space object, with moist heat source warm lump regions, Regarding to summer, to be able keep cold lump regions with the cooling source, because you can improve cultivation environment of plant growth space, it makes stability harvesting through year possible.

[0024]

Namely as for this, this invention, inside greenhouse under outdoor sunlight to install cultivation circulation apparatus 2 of multiple stage type bench structure in seedling of plant and inside clean greenhouse P of closed linear which does cultivation, inside said clean greenhouse P, From main duct 7 for external air adopting to which introduction fan 6 is equipped branch doing in plural, drawing through the branch duct 8 which it installs, because introduce clean air into the clean greenhouse P, it makes greenhouse which loses sky light, side window where the pathogenic insect invades it introduces necessary external air through filter 9, It is something which invasion of pathogenic insect furthermore can be gone make cultivation, namely pesticide-free cultivation which does not use pesticide possible do organic cultivation in efficient by designating air of greenhouse interior as the clean.

Furthermore, outside weather how being, because greenhouse is closed linear, it does not receive influence where those are large, by the fact that cultivation through year is made possible it makes the stabilization of agriculture warp barracks possible.

[0025]

In addition, drawing through branch duct 8 which is installed in underside of cultivation circulation apparatus 2, inside clean greenhouse P, as for cold temperature region in the lower, as for heat limits respectively it becomes something which was formed in upward direction by introduce clean air into clean greenhouse P.

Because of that as for plant of growth way of post emergence inside the cold temperature region in lower stage pool 3B of installation in, for example, downward position, as for plant after growth respectively being mounted in heat intraregional in upper stage pool 3A of installation in upward position, when growth are done, Because it becomes something which growth is done inside temperature region which becomes environment where temperature difference which responds to growth step of respectively was formed, growth it is something where it becomes possible to do, in quite efficient.

[0026]

As for cultivation circulation apparatus 2 of top and bottom two-stage type bench structure, mounting cultivation container Q which plant which germination has been done rooting is done, water being done, water injection when making sprinkling state, riding in flow due to buoyancy, being installed cultivation container Q in lower stage pool 3B at time of seedling which it moves to downstream side and upward direction of said lower stage pool 3B, cultivation container Q where seedling ends with downstream side of said lower stage pool 3B to be moved mounted with upstream side, cultivation container Q to flow to downstream side, because the occasion where it arrives, plant was designated as has upper stage pool 3A when growing which to harvesting possibly it tries to grow, greenhouse cultivation device 1 in spite of soil cultivation because of cultivation circulation apparatus 2 of top and bottom two-stage type the cultivation surface area reaches two times and becomes effective use of land.

From first, because layout configuration is possible these bench 2A, 2B, pool 3A, 3B respectively to the multiple stage, corresponding to those, it is something which substantially can make cultivation surface area large.

[0027]

cultivation container Q, in order for water from bottom surface to be supplied to the uniform to cultivation container Q interior, to form bottom in mesh, root part of the plant of cultivation container Q interior to come in contact with air, in order for the necessary oxygen to be supplied, because it laid arranged nonwoven fabric S in interior surface, root part of plant when water doing ends, is efficient through nonwoven fabric S air and contact, Be able to acquire necessary oxygen securely, it is possible to do cultivation rearing which is stabilized.

[0028]

Because in aforementioned cultivation container Q, when it becomes water depth of the fixed water level which is each pool 3A, 3B because cultivation container Q entirety raised portion buoyancy device R which is moved is installed by buoyancy device R, with manual operation of cultivation container Q on cultivation circulation apparatus 2 movement excludes, furthermore as for cultivation device 1 is the



water stream mobile with buoyancy, to do simply even with old person, women, it to be possible It goes hand in hand with fact that miniaturization it is possible, the cultivation container Q itself farm work easily and efficient furthermore it reaches point where it can do simply.

[0029]

Because, when being insufficiency of light intensity in lower stage pool 3B, light supplement device 4 which irradiates close distance light supplement is allotted to mountable in lower face of upper stage pool 3A, when sunlight condition is bad and the environment which is necessary for seedling even with night time can be acquired.

[0030]

To provide air intake part 11 inside greenhouse which connects external air intake part 10 and the other end opening side which direct one end opening side to outward direction to inside clean greenhouse P in the top end of main duct 7 for external air adopting which is allotted to outside of clean greenhouse P, respectively opening and closing type damper 12, 13 being equipped in air intake part 11 inside external air intake part 10 and greenhouse, case of internal air circulation closing the opening and closing type damper 12 of external air intake part 10 side, In addition at time of external air intake as for opening and closing type damper 13 of air intake part 11 side inside greenhouse because are closed, through main duct 7, invasion of germs or other pathogenic insect can be prevented with external air to clean greenhouse P interior.

[0031]

In main duct 7, branch duct 8 respectively, in winter in moist heat source and the summer which are made heater device which supplies hot air inside the greenhouse making use of main duct 7 and branch duct 8 mounting the cold moist heat source device 14 which in cooling source which is made air conditioning equipment which supplies cool air from both duct 7, 8 respectively is changed, with that, In growth space of plant to keep warm lump regions at time of heater, when air-conditioning to be able keep cold lump regions, outside weather how being, because greenhouse is

closed linear, it does not receive influence largely, it makes cultivation through the year possible, makes stabilization of agriculture warp barracks possible.

[0032]

Transmitting sunlight, because in order suffering or to become opening possible on ceiling side inside clean greenhouse P, it arranged temperature-holding curtain 15 which at same time possesses temperature-holding power of moist heat, cooling, you can keep warm lump regions which are created with hot air which is supplied and cold lump regions which are created with cool air from main duct 7, branch duct 8, Namely because you can improve cultivation environment of plant growth space, stability harvesting through year was made possible.

[0033]

Because on ceiling side of clean greenhouse P, wind pressure damper 16 which exhaust is done has been mounted amount of air which corresponds to external air quantity which is introduced to outside, conventional way sky light, side window, eaves window or other air circulation equipment do not need, receive influence of external air directly, there are not kind of times when it is possible, to make atmosphere maintain which clean greenhouse P interior usual is stabilized.

[0034]

Because, seedling and fixture, material, etc., which is used for cultivation the sterilization doing sterilization room 17 in order after to carry into clean greenhouse P was provided on corner of clean greenhouse P, through fixture, material etc, invasion of germs or other pathogenic insect can be prevented with external air to clean greenhouse P interior.

[0035]

cultivated soil sterilizing device 18A, 18B of pair which cultivation container Q which is filled heat sterilization is done adjacent to be installed in site which is adjacent to sterilization room 17 because, on one hand cultivated soil sterilizing device 18A during heat sterilization treatment, as for cultivated soil sterilizing device 18B of

other cultivated soil T do cooling to proper temperature at time of rooting of cultivated plant, cultivated soil T through cultivation container Q which is filled, invasion of germs or other pathogenic insect can be prevented with external air to clean greenhouse P interior.

[0036]

Because raising concentration of carbon dioxide gas in growth of plant the effective means to have become, with conventional greenhouse opens sky light and side window, use of carbon dioxide gas was limited to winter, but with this invention as for clean greenhouse P because it is a closed type greenhouse which does not use sky light and side window, It is possible and to utilize carbon dioxide gas through year it impossible to assure increase of yield.

[Brief Explanation of the Drawing(s)]

[Figure 1]

It is a front cross section which shows outline in embodiment of this invention device.

[Figure 2]

It is a top view similarly.

[Figure 3]

Similarly being something which shows cultivation container, as for (a) as for partially cutout planar view, (b) it is a sectional view.

[Figure 4]

It is a oblique diagram of essential part which similarly shows outline of cultivation circulation apparatus.

[Explanation of Symbols in Drawings]

1

greenhouse cultivation device

external air intake part

11

air intake part inside greenhouse

12

opening and closing type damper

13

opening and closing type damper

14

Cold moist heat source device

15

temperature-holding curtain

16

wind pressure damper

17

sterilization room

18A

cultivated soil sterilizing device

18B

cultivated soil sterilizing device

19

air shower room

2

cultivation circulation apparatus

20

cold storage

21

carbon dioxide gas application device

2A

upper stage bench

2B

lower stage bench

3A

upper stage pool

3B

lower stage pool

4

Light supplement device

5

waterproof sheet

6

Introduction fan

7

Main duct

8

Branch duct

8A

blowing orifice

9

filter

P

clean greenhouse

Q

cultivation container

R

buoyancy device

S

nonwoven fabric

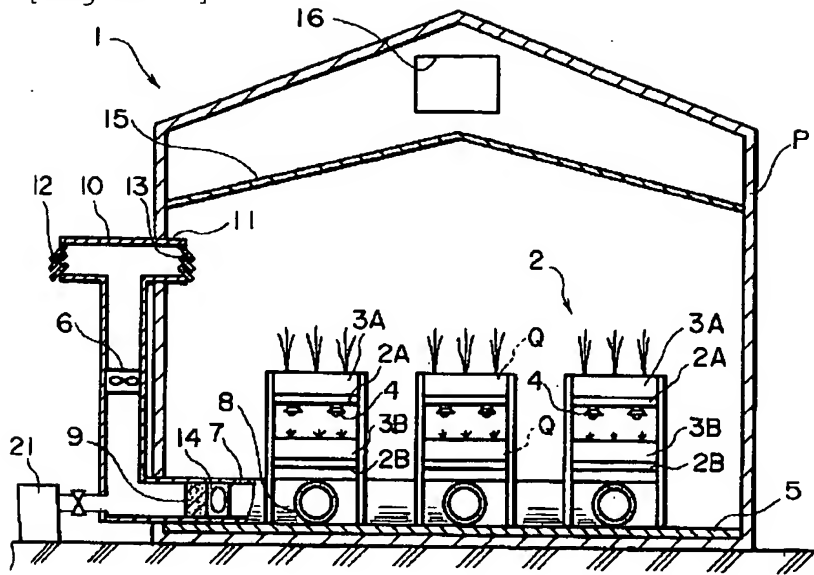
T

cultivated soil

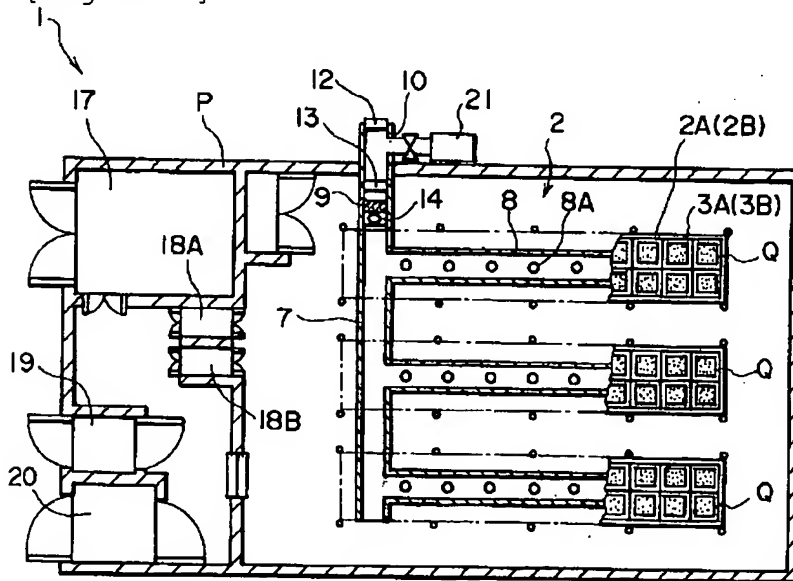
U

mesh bottom

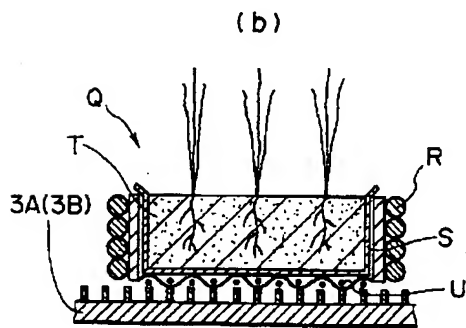
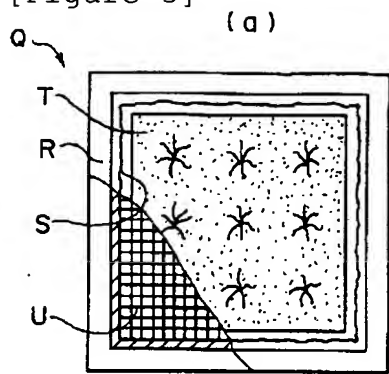
[Figure 1]



[Figure 2]



[Figure 3]



[Figure 4]

